Space Weather Forecast

Issued on Tuesday, 09 May 2023 at 23:54 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Due to industrial action by Met Office staff on 10 May, which is planned to last for 24 hours, this product has been prepared and issued earlier than usual. The next issue may also be affected by this industrial action.

Space Weather Forecast Headline: G1/G2 Minor/Moderate geomagnetic storm conditions expected late 10 into 11 May. S1/Minor Solar Radiation Storm ongoing. Further R1/R2

Minor/Moderate radio blackouts expected.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity is High with several Moderate flares observed, all from the medium sized, but magnetically complex region in the northwest. The largest region, in the northern centre disc appeared largely inactive, although some minor development in the spots within the group has taken place. These sunspots are among ten currently on the disc. All others are small and/or simple regions at present. A number of Coronal Mass Ejections (CMEs) were observed leaving the sun in the past 24 hours. The majority if not all of the ejecta appears to be well-ahead or behind of Earth orbit, however, some Earth-directed component cannot be completely ruled out.

Solar Wind / Geomagnetic Activity: The solar wind showed a mainly declining profile and remained mostly at slightly elevated levels. The Interplanetary Magnetic Field (IMF) strength was largely weak with the important north-south component also varying weakly. Resultant geomagnetic activity was Quiet to Active (Kp1-4).

Energetic Particles / Solar Radiation: Solar radiation started above the S1 Minor Solar Radiation Storm threshold with a peak of 38pfu at 09/0150UTC, then declined below this level at around 09/1300UTC.

Four-Day Space Weather Forecast Summary

Solar Activity: Moderate to High activity is likely to continue, with further M-flares likely and a slight chance of isolated X-class flares.

Solar Wind / Geomagnetic Activity: A near-full halo CME was observed in imagery with the moderate-class flare at 07/2323UTC. Although much of the ejecta appears to be directed towards the northwest an Earth-directed component is expected and has been modelled to arrive at Earth either on late 10 or early 11 May. Earth is otherwise currently in a declining fast wind regime. Slightly elevated winds will probably ease to Low levels through the first 24 hours

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of the forecast. A minor resurgence in the solar wind may occur late on 11 May due to yet another 'coronal hole' fast wind. Any impacts are expected to be weak based on 27-day persistence, in any case most likely swamped by the concurrent arrival of the CME (detailed above). On 10 May Quiet to Unsettled activity is expected, giving way to an expected G1-G2 (Minor to Moderate) storm, either late on 10 May or else early 11 May, with a chance of G3 (Strong) geomagnetic storm levels being reached. This risk should recede to a chance of G1 by 12 May given uncertainties in recent CMEs.

Energetic Particles / Solar Radiation: Solar radiation levels are likely to remain below the S1 threshold with a declining trend unless any response from the mid-high Moderate flare events from a sunspot in the northwest is observed. The chances of S1 being maintained after midweek should fall - in the absence of further significant flare activity.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	80	80	40	20
Strong	G3	No	20	30	10	10
Severe	G4	No	5	5	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	80	80	80	80
Very Active	R3 to R5 X	No	20	20	10	10

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	Yes	40	30	25	25
Very Active	≥ S3 *	No	3	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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